

NEXT GENERATION

# BROADBAND ACQUISITION SYSTEM

## TAU T - 8CH-24R MK2

**TAU T - MK2** high resolution digitizer measures 100mm by 100mm by 220mm as an 8-channel high resolution scientific digitizer.

**TAU T - MK1** can be effectively used in permanent or short term multidisciplinary scientific experiments such as:

- Single or large scale seismic networks
- Earthquake Early Warning Systems (EEWS)
- Volcanology
- Infrasound array networks
- Structural health monitoring
- Applications where "Seismic-Switch" is required
- Hydrocarbon exploration
- Permanent reservoir monitoring
- Induced seismicity detection
- Explosion monitoring
- Borehole seismology
- Vertical seismic profiling
- Cross hole seismic experiment
- Micro-seismic monitoring
- Strain-Gauge experiments

The main design principle of the digitiser is to be used as high-resolution acquisition digitiser and to measure and configure all aspects of Multidisciplinary Seismic Station activities.

In addition to the 8 high precision 24-bit digitiser channels, there are further 9 analogue input channels to monitor the station parameters or activities.

*The product specifications and the stated data are subject to change without prior notice.*



TAU generates two separate streams of data, one based on FIR “a-causal” filter while the other stream is based on Causal filter. In addition to the acausal and causal filter outputs a separate Low Latency Data LLD is also transmitted with minimum latency as small as 0.1 Seconds for 100 s/s LLD stream. The LLD applies to 6 channels of 8 channel analogue inputs of TAU digitiser.

FOUR (4) different sample rates per channel can be outputted concurrently. This feature allows the digitiser to be deployed for multidisciplinary Seismic applications.

TAU Digitiser can output the following user selectable sample rates: 1,2,5,10,20,40,50,100, 125,200,250,500,1000. In addition to the selectable primary sample rates, (there are optional) 4000 and 2000 s/s data output rates available from TAU digitiser.

The digitizer 8 channels inputs have remotely adjustable gain stage PGA providing versatile high dynamic range analogue input stage. Each Channel PGA gain can be controlled independently.

The 4th channel of the digitiser is connected

to the Digitiser calibration signal. This channel is measures accurately the calibration signal outputted from the digitizer as the sensor calibration signal. The 8th Channel of the digitiser is connected to the environmental input connector of the digitiser to connect

Many software packages are available to monitor, display and store TAU data. Examples of software packages that can be used are:

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- Earthworm
- SWARM
- SEISGRASM2K
- SeisComp3/4
- jAmaseis
- [GaiaCode software Packages: PC based,](#)
  - Sensor and/or digitiser Configuration-Control
  - MiniSeed Data Storage
  - Gaia format & Low latency Data
  - Data Display

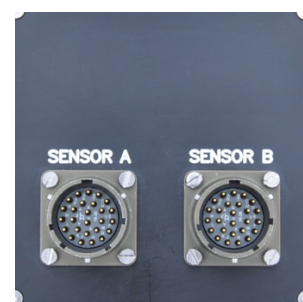
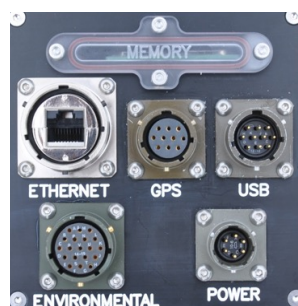
## CONNECTOR OPTIONS AND CONFIGURATIONS:



The digitizer is offered with Mil Spec compatible connectors with MIL-C-26482 specifications. Various water proof TCP/IP connector options are available.

The two SD storage cards, can be inserted-removed with ease as the SD Card is slotted behind an “O” ring sealed removable aperture labelled “Memory”, see Figure 4.

Two analogue sensors can be controlled and configured via two independent serial ports. Analogue sensors can be calibrated independently. All the analogue inputs are differential with isolated ground from the sensor casing and input power ground.



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## TECHNICAL SPECIFICATIONS

**Analogue Input:** 8 independent Channel 24 BIT data inputs. All inputs are Differential with transient protection.  $\pm 20$  V standard, (40V PP).

**Options:** 40 V,20 V,10V,5V,1V without (PGA). Other options are available depending on signal source characteristic.

**Analogue Input Impedance:** 51 K  $\Omega$ , Other options are available. With 1 Pole Low-Pass antialiasing Filter.

**Configurable Preamplifier (PGA):**

**Gain settings** \*1, \*2, \*4, \*8 \*12. Each channel independently controlled.

**Analogue Input Signal Source:**

- Active broadband seismometers,
- Electromagnetic seismometers: (Short period-Geophones),
- Rotational seismometers, Microbolometers, Strain Stress sensors. Multidisciplinary-sensors.

The spare input channels can be allocated to either broad band sensor or other sensors requiring high resolution measurements.

Can be used for High resolution tilt meters and Infrasound sensors.

**State of health signal Inputs:** Up to 9 further analogue input Channels are available. Full scale  $\pm 20$  V standard. Selectable sample rates.

**Digital Inputs/Outputs:**

**CAN Bus: (OPTIONAL) Control Area Network (CAN)** Allows communication without a Host computer. Many digitizer modules can be connected in series for array network.

**RS232 Serial input/output:**

Control and acquire digital data. Interface to e.g.: Weather stations, digital infrasound sensors, digital strain/stress gauges.

**Logic Control Lines, for analogue sensors:**

Calibration enables, Lock\_Unlock\_Centre of Broad Band (ALPA) sensors. Supports all the Analogue sensor control commands.

and further 3 optional logic control lines.

**Automatic centring of the Broad band (ALPHA) sensors based on Mass position level.**

**Independent latching relays:** Used to switch (ON-OFF) Machinery, as a Seismic Switch.

**Analogue Output Calibration Signal Source.** 24-bit DAC buffered output with adjustable amplitude.

**Wave forms:** Square, Sine, Step, Pulse with duty cycle and frequency control and Pseudo random signals. Generated with an internal synthesizer.

**Operational Performance:** Independent 8 24-bit Delta Sigma Digitizer.

**Dynamic Range:**

**Sample rate:** 1K Hz: -122.2dB, at:100 Hz: -138 dB, at: 10 Hz -138.6dB. (Full scale P-P to RMS Shorted input Noise)

**Gain Accuracy:**  $\pm <0.5\%$ , Each channel calibrated.

**Sample rates:** User selectable sample rates: 1,2,5,10,20,40,50,100, 125,200,250,500,1000. Four separate same rates are available concurrently from each Channel. Optional, 4000, 2000 samples/second Output from 6 channels are available

**Decimation (FIR) Filter Options:**

Causal (minimum phase) and a-causal (linear phase) filters, Applicable to all the sample rates and concurrently available. Four separate same rates are available concurrently and can be mixed with Causal and a-causal output options.

**Digital (FIR) filters:** User selectable, high pass and band pass digital filters.

### DATA STORAGE

**Format:** MiniSEED (SeedLink server) and PCF (Proprietary data Format). Other formats are available, (ask sales). Low latency data outputs are available concurrently with continuous data streams. Multiple data format outputs are available.

**Internal Memory:** 8 G Byte

**Removable Media:** accessible externally, behind a waterproof cover.

**Dual SD Card:** 2 x 32 G Byte for DATA storage. Continuous and Triggered data is stored with in the digitiser storage memory.

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## TRIGGERS:

Threshold trigger with high-pass filter. User selectable high pass filter.

STA/LTA: Band passed ratio-metric trigger. Concurrently available in addition to continuous data streams.

## PHYSICAL:

SD card: Removable, behind a waterproof storage cavity.

LED Indicators: TCP/IP activity. Two LED's indicates SD card in use.

Time Synchronization, Time Source: GPS, GNSS, NTP or internal source.

GPS: Maximum 150 meters Cabling.

NTP: NTP option software selectable.

Timing Accuracy:  $\pm < 50$  Nanoseconds

GPS Unit: External GPS Receiver with RS232 Interface, 1 pps output.

GPS location is reported with Satellite Information from at least 3 satellites. GPS module cable max 150 Meter. Powered through digitizer, 9 to 36 Volt Operation. Transient protected.

Optional Internal GPS: Receiver with external Antenna. The external antenna with 15 meters of coaxial cabling.

Format: NMEA Operational temperature -40 to 85. degrees centigrade.

## USER INTERFACES:

10/100 Base-Ethernet, USB, Multiple Serial interface.

IP Addressing: Static, dynamic (DHCP) or local IP.

Protocols: UDP/IP unicast/multicast.

Connectivity: Supports ADSL, GSM, TCP/IP.



Power Supply: +9 - +36 V DC, Galvanically Isolated analogue Input stage of digitiser. Polarity protected, with current limit. Over Voltage protection with Transient suppression and voltage clamping diodes.

Current Consumption values of digitizer and sensor are provided as State of health sensor parameter.

Power Consumption: 1.5 W with max 1000sps and TCP/IP. <1 Watt without TCP/IP No communication

## PHYSICAL CONNECTION:

Analogue sensor: Male 26 Way.Mil.Circular/Shell size: 16.

Power Connector: 6-way Male.

USB Port: 10 Way.Mil. circular/Shell size: 12 (Optional Serial coms available).

GPS Connector: Female 10 Way.Mil. circular/Shell size: 12

Ethernet Connector: RJ-45, RJN2200 Mil. Circular.

Cabling: Cabling for interface is provided.

## MECHANICAL PARAMETERS:

Enclosure: Anodized Aluminium and engineering plastics. With "Finger grips" as handle.

Humidity: 0 to 100% Rated to IP 68 with potted and mated connectors. Totally waterproof even immersed in 3 meters of water continuously, Mating connectors must be waterproof .

Operating temperature: -20 to 80 °C (all components of the digitiser are rated to be -40 Degrees Centigrade).

GPS temperature specification: -40 to 80 centigrade.

Weight: 1.6 Kg.

Dimensions: 220\*100\*100 mm.